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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Morency, *et al.* Examiner: Takeuchi  
Serial No.: 10/583,183 Art Unit: 4162  
Filed: March 12, 2007  
For: Hydrometallurgical Separation Process Of Steel Mill Electric Arc Furnace (Eaf)  
Dust And The Pigments Obtained By The Process

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

**DECLARATION UNDER 37 C.F.R. § 1.132**

I, Dr Holger Weiss, declare and state as follows:

1. I am a Prof. Dr. rer.nat, Dipl. in Geology; I am the former Head of Department of "Industrial and Mining Landscapes" at UFZ-Umweltforschungszentrum Leipzig-Halle, Dept. of Hydrogeology from 1994 to 2003; I am currently the Head of Department "Groundwater Remediation" at Helmholtz Centre for Environmental Research-UFZ; I am an associate professor at Université du Québec à Montréal; I am a lecturer in Industrial Hydrogeology and Environmental Geology at University of Tübingen; I am a lecturer in Groundwater Remediation at University of Halle-Wittenberg; and I am an External Professor at the University of Tübingen.
2. I am familiar with the above-identified application, its claims, and I have read the outstanding Office Action mailed September 10, 2009. I am also familiar with the cited references JEBRAK et al. and MATTHEWS et al. (US 5,227,349).

3. The above-identified application claims a hydrometallurgical process for the treatment of steel mill electric arc furnace (EAF) dust containing agglomerates of small ferrite particles and larger magnetite particles, the ferrite particles coating by adsorption the larger magnetite particles, the dust further containing calcium oxide, zinc oxide and a toxic amount of leachable lead together with minor elements selected from the group consisting of Mg, Cr, Cu, Cd, V, and chlorides, the process comprising the steps of:

- a) washing the EAF dust in water to dissolve soluble salts, metals and simple oxides contained in the dust, said washing step being performed under agitation and with an alkaline pH;
- b) decanting the solution of step a) to obtain a supernatant liquid containing the dissolved salts, metals and simple oxides, and a slurry containing ferrites and magnetites, a non toxic amount of leachable lead and a reduced amount of calcium;
- c) separating the slurry and the supernatant liquid;
- d) adding to the slurry obtained in step c) a phosphate to disperse the ferrite particles adsorbed on the magnetite particles and sequester calcium compounds; and
- e) treating the slurry from step d) to produce pigments selected from the group consisting of ferrite pigments, magnetite pigments and ferrite/magnetite pigments.

4. The invention defined in claim 1 is non-obvious for the following reasons I-III:

- I. Claim 1 has the limitation that the addition of the phosphate surfactant occurs after washing soluble salts from the EAF dust in step a) of claim 1. This element of the claim is not disclosed or suggested by the cited references. Furthermore, it was found that this previous washing step to remove the soluble salt was necessary to allow the phosphate to have its improved function. Claim 1 clearly claims that step d) occurs after step a).

II. JEBRAK et al. and MATTHEWS et al., cannot be combined with JEBRAK et al. to establish a case of obviousness. MATTHEWS et al. discloses a process for producing high solids slurry of beneficiated kaolin clay. In the process, crude kaolin clay is first "blunged", i.e. mixed with water, in the presence of any one of a number of dispersants, one of which can be sodium metaphosphate. There is no pre-step of removing soluble salts. Rather, the initial washing is done concurrently with a dispersing agent. The resulting suspension is then degritted and passed through a magnetic collector to remove iron-based impurities which cause discoloration. The dispersing of MATTHEWS et al. prepares the mixture for a "high intensity magnetic field" to remove all iron-based materials. Thus, MATTHEWS et al.'s dispersing agent is not at all intended or able to function with MATTHEWS et al.'s process to disperse two different iron-based phases, ferrite particles and magnetite particles, from each other as in the present invention defined in claim 1. MATTHEWS et al.'s teaching only enables a rough, general dispersing of the crude kaolin clay material, not a targeted dispersing of ferrite particles adsorbed on magnetite particles. MATTHEWS et al. see iron-based compounds as impurities and are interested in bulk removal of all iron-based impurities. MATTHEWS et al. do not disclose or even suggest dispersing two phases of iron-based compounds which are adhered to each other, which is the case for claim 1.

MATTHEWS et al. also mention the addition of a dispersing agent after a bleaching step to re-disperse an acid flocculated slurry prior to spray-drying it. MATTHEWS et al. do not disclose washing soluble salts prior to adding a phosphate surfactant, but rather disclose that by-product salt and residual dispersing agent remain in the slurry subjected to spray drying and cause an undesirable degradation in the brightness of the spray dried kaolin particles (see MATTHEWS et al. col. 11, ll. 36-64).

MATTHEWS et al. is clearly not concerned with the particular type of dispersing agent used in its process. There is absolutely no teaching that a phosphate could be any different from other dispersing agents. This is because MATTHEWS et al.'s teaching has nothing to do with the specific dispersion required for EAF slurry of claim 1,

where ferrites particles are adhered to magnetite particles due to mechanisms particular to those compounds.

In fact, MATTHEWS et al. disclose a different process, for treating different materials, using dispersing agents for a different effect, to obtain a different end-product as compared to JEBRAK et al. The mere mention of sodium metaphosphate as a dispersing agent for a clay-based suspension is factually insufficient to combine MATTHEWS et al. with JEBRAK et al.'s teaching of an EAF dust treatment process which suggests a dispersant could be used, to somehow arrive at claim 1 in which a phosphate surfactant is added at a particular step to achieve advantageous dispersion of the ferrite particles adsorbed to magnetite particles and sequestration of calcium compounds. Based on a factual analysis of JEBRAK et al., MATTHEWS et al., and the differences of the claimed invention, a person skilled in the art would not have been motivated to use sodium metaphosphate taught by MATTHEWS et al. in the process of JEBRAK et al.

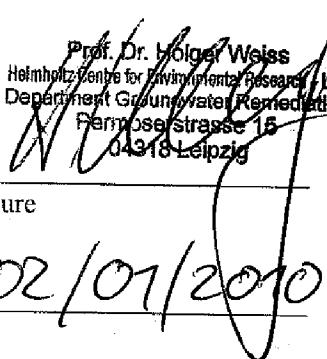
III. Another point is that the phosphate surfactant of claim 1 also enables advantageous results by both dispersing the ferrite particles adsorbed to magnetite particles and also sequestering calcium compounds that are contained in the EAF dust slurry, to improve the downstream recovery of the pigments. JEBRAK et al. and MATTHEWS et al., taken separately or alone, do not suggest that a phosphate could to any predictable degree have such improved effects compared to other dispersants. A person skilled in the art could not have predicted that by combining MATTHEWS et al. and JEBRAK et al., better results as in the process of the claimed invention, could have been obtained. In other words, the results of the present invention were not predictable in view of MATTHEWS et al. and JEBRAK et al. combined together.

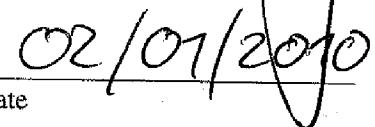
5. Reading MATTHEWS et al., I would not have thought that using a phosphate would have predictably allowed identification of any of the particular mineral phases in EAF dust mentioned by JEBRAK et al. In fact, MATTHEWS et al. lead me to expect that its dispersants would disperse iron-based compounds away from clay-based compounds, allowing a bulk magnetic separation, and thus could not function as desired by JEBRAK et al. who are not

interested in clay-based compounds at all, but rather dispersing different mineral phases away from each other.

6. In any case, claim 1 defines dispersing specific phases, ferrite particles adsorbed onto magnetite particles, while also sequestering calcium compounds, by adding a phosphate surfactant at a special point in the process which requires a pre-treatment of removing soluble salts from the EAF dust, which is not found in either of JEBRAK et al. or MATTHEWS et al. Claim 1 is distinct and also yields results that are unpredictable from what is taught in the JEBRAK et al. and MATTHEWS et al references. Claim 1 is therefore non-obvious.

Prof. Dr. Holger Weiss  
Helmholtz-Centre for Environmental Research UFZ  
Department Groundwater Remediation  
Ferry-Seeger-Strasse 15  
04318 Leipzig

  
Signature

  
Date